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**Title** : A Quantitative Estimate of the Relative Importance of Factors in the Decline of Southern Resident Killer Whales (Orcinus orca)

**Category** : Conservation

**Student** : Not Applicable

**Preferred Format** : Oral Presentation

**Abstract** : The recent ~20% decline rather than ongoing increase (totaling ~20%) of the Southern Resident population of killer whales is now a management concern. Factors postulated to be causes include: prey availability, toxins, vessel traffic, and other factors; and this paper represents a preliminary effort to quantify their relative importance. The contribution of prey availability was estimated based on summaries of salmon abundance. Toxins were assumed to assert their effect through impaired reproduction with a magnitude based on captive Tursiops. Vessel traffic was modeled to increase energy expenditure and reduce foraging efficiency. Prey availability has declined approximately 90-95% since the early 1800's, suggesting that historically this population may have numbered 1-2,000 individuals, and this is the major long-term factor. Female calves recruited during the period of peak PCB availability in the environment produced fewer than 30% of the expected number of offspring, accounting for a recent population change of about 15%. Increased energy expenditure due to vessel traffic may account for a change of a few individuals. Reduced foraging efficiency due to noise may account for a larger decline, although more data are needed to quantify this. The relatively large decline in L pod relative to other pods suggests that other factors probably account for about half of the change in population growth rate. Candidates for other non-random factors include entanglement, military exercises, disease, and reduction of L Pod specific prey. Reduction in vessel traffic and noise should result in a quick but small increase in population. Elimination of other factors would also result in a quick but small increase in the population. Selection of high-toxin burden individuals out of the population should result in a short-term decline and long-term increase in the population. Restoration of prey resources will be required to result in a large increase in population size.